REMARKS

Claims 1-12 are pending. No claims have been allowed.

Applicant has filed a Request for Continued Examination ("RCE") along with the present Response pursuant to 37 CFR § 1.114.

The Examiner rejected Claims 1, 5-10 and 12 under 35 U.S.C. §103(a) as being obvious over Japanese Patent No. 04254154 ("Yoshida et al. '154") in view of U.S. Patent No. 4,474,018 to Teagan ("Teagan '018") and further in view of U.S. Patent No. 6,330,809 to Boardman, III et al. ("Boardman et al. '809"). The Examiner also rejected Claims 3 and 4 under 35 U.S.C. §103(a) as being obvious over Yoshida et al. '154 in view of Teagan '018, and rejected Claims 2 and 11 under 35 U.S.C. §103(a) as being obvious over Yoshida et al. '154 in view of Teagan '018 and further in view of U.S. Patent No. 6,729,151 to Thompson ("Thompson '151").

Yoshida et al. '154 discloses a water heating system, shown in Fig. 1, having a stated purpose "[t]o provide a configuration capable of embodying higher temperature and lower temperature of heat storage with high efficiency in a heat storage device". A working fluid is compressed by lower stage compressor 1 before passing through auxiliary condenser 2 located within the lower portion of water tank 11. Thereafter, the working fluid is further compressed by higher stage compressor 3 before passing through heat exchanger 4 in the upper portion of water tank 11. As may be seen in Fig. 1, compressor 1, condenser 2, compressor 3, and heat exchanger 4 are arranged in series. After exiting heat exchanger 4, the working fluid passes through expansion device 5 and evaporator 6 before returning to lower stage compressor 1. A similar embodiment is shown in Fig. 2. In this manner, "[t]he auxiliary condenser 2 heat-exchanges [with] heat storage water in the lower part of the heat storage tank 11 while the action side heat exchanger 4 heat-exchanges with heat storage water in the upper part of the heat storage tank."

Teagan '018 discloses a water heating system, shown in Fig. 1, in which a working fluid is compressed by two-stage compressor 18. A first portion of the working fluid at intermediate pressure passes through low pressure condenser 12 and thereafter through capillary tube 26 to evaporator 31. A second portion of the working fluid at high pressure passes through high pressure condenser 14 and thereafter through capillary tube 24 to evaporator 31. After exiting evaporator 31, the working fluid at low pressure passes back into compressor 18. Pump 10 pumps water from water tank 6 through water jackets 17 and 15 which are arranged in series about low and high pressure condensers 12 and 14, respectively, and the water is thereby heated

before returning to water tank 6. In another embodiment, shown in Fig. 6, a pair of heat exchangers 46 and 48 are disposed within water storage tank 38, which also includes a barrier 40 for enhanced stratification of the hot water according to temperature. (col. 7, lines 48-60).

Boardman et al. '809 discloses a generator/motor cooling assembly, shown in Fig. 1, in which a gas flow through cooler 12 is cooled by water flowing through a pair of heat exchangers 14 and 16 which are arranged in parallel. Cooling water for heat exchangers 14 and 16 is supplied from "an ambient water source 18 (that could be a river or other suitable source of water)." (col. 2, lines 39-41).

Thompson '151 discloses a heat pump system 6, shown in Fig. 2, which includes liquid/gas heat exchanger 22 which transfers heat from the working fluid leaving condenser 14 to the working fluid leaving evaporator 20 to increase the overall efficiency of the system. A fluid to be heated, such as water, passes through a pair of heat exchangers 14 and 8 which are arranged in series.

Applicant respectfully submits that independent Claims 1, 9, and 12 are not obvious over Yoshida et al. '154 in combination with Teagan '018 and Boardman et al. '809 because one of ordinary skill, at the time the present invention was made, would not be motivated to make such a combination. In the Office Action of May 26, 2005, the Examiner appears to contend that it would have been obvious to one of ordinary skill at the time the present invention was made to provide the apparatus of Yoshida et al. '154 with a water circuit in view of Teagan '018, and also with first and second heat exchangers arranged in parallel, in view of Boardman et al. '809.

On the contrary, Applicant respectfully submits that one of ordinary skill in the art would not be motivated to add a water circuit, such as that disclosed in Teagan '018, to the apparatus of Yoshida et al. '154. In particular, one of ordinary skill in the art would recognize that Yoshida et al. '154 discloses a water tank 11 having a first heat exchanger 2 and a second heat exchanger 4 disposed *within* water tank 11 in order to facilitate transfer of heat directly between the heat exchangers 2, 4 and the water within water tank 11. Additionally, heat exchanger 4, which one of ordinary skill in the art would recognize as being hotter than heat exchanger 2, is positioned within water tank 11 above heat exchanger 2 such that the water within the upper portion of water tank 11 is heated to a greater extent than the water in the lower portion of water tank 11, to thereby more efficiently create a heat gradient within water tank 11. To this end, Yoshida et al. '154 specifically states that "[t]he auxiliary condenser 2 heat-exchanges [with] heat storage water

in the lower part of the heat storage tank 11 while the action side heat exchanger 4 heat-exchanges with heat storage water in the upper part of the heat storage tank."

Disadvantageously, providing the apparatus of Yoshida et al. '154 with a water circuit, as in Teagan '018, would not only add additional parts and components to the overall system of Yoshida et al. '154, but would also destroy the underlying purposes of Yoshida et al. '154, namely, providing a pair of heat exchangers 2, 4 *within* water tank 11 for direct heat transfer, and also providing the hotter heat exchanger 4 at an upper portion within water tank 11 above the other heat exchanger 2 to establish a heat gradient in water tank 11 more efficiently.

In fact, Teagan '018 itself teaches that using a water circuit to convey water from a storage tank to heat exchangers for heating, and then returning the heated water back to the storage tank, is quite different from positioning heat exchangers within the water tank itself. In the embodiment shown in Fig. 6 of Teagan '018, a water heating system is shown in which a pair of heat exchangers 46 and 48 are disposed within water storage tank 38, which also includes a barrier 40 for enhanced stratification of the hot water according to temperature.

Further, one of ordinary skill in the art would not be motivated to combine the parallel heat exchangers of Boardman et al. '809 with the apparatus of Yoshida et al. '154. Although Boardman et al. '809 discloses a pair of heat exchangers 14 and 16 which are arranged in parallel with respect to the water flow therethrough, the Boardman et al. '809 apparatus uses water from a water source 18, conveyed through heat exchangers 14 and 16, to take up heat from (*i.e.*, to cool) a *gas flow* which is passed around the heat exchangers 14 and 16. Water source 18 of Boardman et al. '809 is not a water storage vessel, but rather is a heat sink – namely, "an ambient" water source which "could be a river or other suitable source of water." (col. 2, lines 39-41). Also, heat exchangers 14 and 16 of Boardman et al. '809 are arranged *in series* with respect to the flow of gas therearound, and Boardman et al. '809 states that "[t]o obtain additional cooling capacity, chilled coolant is circulated through a second heat exchanger downstream of the ambient following or first exchanger. Arranging them in series (with respect to the gas flow) greatly increases the cooling efficiency . . .". (col. 1, lines 44-48). Thus, one or ordinary skill in the art would recognize that the manner in which the heat exchangers 14 and 16 of Boardman et al. '809 are used is very different from that of the heat exchangers of Yoshida et al. '154.

Further, one of ordinary skill in the art would not be motivated to provide the exchangers 2 and 4 of Yoshida et al. '154 in a parallel relationship. As discussed above, the intent of Yoshida et al. '154 is to arrange heat exchangers 2, 4 in a manner in which the hotter heat exchanger 4 is positioned within water tank 11 above the other heat exchanger 2 to provide a heat gradient in water tank 11 more efficiently. Yoshida et al. '154 accomplishes the foregoing by arranging compressor 1, condenser 2, compressor 3, and heat exchanger 4 are arranged in series, wherein working fluid is compressed by lower stage compressor 1 before passing through auxiliary condenser 2 located within the lower portion of water tank 11, and thereafter, the working fluid is *further* compressed by higher stage compressor 3 before passing through heat exchanger 4 in the upper portion of water tank 11.

For the foregoing reasons, Applicant respectfully submits that independent Claims 1, 9, and 12 are not obvious over Yoshida et al. '154 in combination with Teagan '018 and Boardman et al. '809 and further, because Claims 2-8, 10, and 11 each depend from independent Claims 1 and 9, Applicant further submits that Claims 2-8, 10, and 11 are also not obvious over Yoshida et al. '154 in combination with any of the other of the references applied by the Examiner.

It is believed that the above represents a complete response to the Official Action and reconsideration is requested. Specifically, Applicant respectfully submits that the application is in condition for allowance and respectfully requests allowance thereof.

In the event Applicant has overlooked the need for an additional extension of time, payment of fee, or additional payment of fee, Applicant hereby petitions therefor and authorizes that any charges be made to Deposit Account No. 02-0385, Baker & Daniels.

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Should the Examiner have any further questions regarding any of the foregoing, the Examiner is respectfully invited to telephone the undersigned at (260) 424-8000.

Respectfully submitted,

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I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on: August 22, 2005

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Date